

Remarks/Arguments

Claims 1-5 and 7-14 stand rejected.

Examiner Interview

An Examiner Interview was conducted between Applicants' Representative Eric Berkowitz and Examiner Luong T. Nguyen. The Examiner is thanked for his efforts. During the interview, Applicants' Representative argued the patentability of claim 1 and, in particular, the patentability of claim 1 in view of the teachings of Hynecek (US 7,218,350). The Examiner agreed that current claim 1 overcame the rejection of record and stated that he would consider such an argument in a formal response.

Rejection of Claims 1-5 and 7-14

In the Office Action, at item 4, claims 1-5 and 7-14 are rejected under 35 U.S.C. §103(a) as unpatentable over Borg (US 6,476,864) in view of Hynecek (US 7,218,350) further in view of Kozlowski (US 5,892,540).

This ground of rejection is respectfully traversed.

Claim 1 is directed to an active pixel sensor array sampling system, and recites:

... the reference amplifier separately samples in series, one at a time, the respective unique reference voltage for each pixel in the row of pixels, as each pixel in the row of pixels is sampled by a respective one of the video amplifiers, and

a differential amplifier receives both, the video voltage and the respective unique reference voltage, sampled in series, from each pixel in the row of pixels, and provides, in series, a corresponding differential voltage output.

That is, the reference amplifier separately samples in series, one at a time, the respective unique reference voltage for each pixel in the row of pixels, as each pixel in the row of pixels is sampled by a respective one of the video amplifiers. Moreover, the video voltage and the respective unique reference voltage from each pixel in the row of pixels are received by the differential amplifier to provide a corresponding differential voltage output.

Borg Reference

In the Office Action, at page 3, the Examiner acknowledges that "Borg et al. fails to specifically disclose ... the respective unique reference voltage for each pixel in a row of pixels." Applicant agrees with the Examiner and further submits that Borg does not disclose or suggest the use of a respective unique reference voltage for each pixel in a row of pixels because Borg merely contemplates the use of a reference voltage V_{ref} 88. Borg is silent, however, regarding V_{ref} 88 providing a unique voltage for each pixel in a row of pixels.

Hynecek Reference

Hynecek discloses a CMOS image sensor with vertical scanner 306. A horizontal scan register 319 is readout by applying a clocking signal to line 318. Hynecek further discloses that when the horizontal register is completely readout a pulse is applied to line 316 that advances vertical addressing register (vertical scanner) 306 to select the next row of pixels for comparison and to reset the horizontal scan register 319 making it ready for the next horizontal scan. This process in Hynecek is repeated until all the rows of the array are processed and read out. In the next step a pulse is applied to line 310. **This pulse resets the vertical shift register to make it ready for the new array scan and at the same time causes reference generator 315 to decrement the reference voltage by one unit step.** Finally, applying the reset pulse to line 323 resets the reference generator 315. This completes the sensor frame time cycle. Hynecek also discloses that the sensor array is completely scanned many times during one frame time cycle and that the **number of scans equals the number of decrements of the reference voltage.** (See Hynecek at col. 3, lines 26-62.) That is, Hynecek teaches that the reference voltage of the Hynecek sensor (i.e., corresponding to the respective unique reference voltage recited in claim 1) changes voltage levels after each scan of the sensor array (i.e., after every pixel has been scanned). This is reinforced by the disclosure that the reference voltage of the Hynecek sensor is decremented the same number of time as the number of scans of the sensor array and that the voltage level (unit step decrements 404) stay constant during time intervals 405 when the array is scanned. (See Hynecek at col. 4, lines 31-34.) Thus, in Hynecek, all of the pixels of the array during one scan have a single reference voltage level V_{ref} and, more particularly, such a reference voltage in Hynecek is **NOT** a respective unique voltage for each pixel in a row of pixels.

Kozlowski Reference

The addition of Kozlowski does not overcome the deficiencies of Borg and Hynecek. This is because Kozlowski does not disclose or suggest the use of "the respective unique reference voltage for each pixel in the row of pixel," as required by claim 1. Instead, Kozlowski discloses the use of a reference voltage REF 1 set to about 2 volts for a 5V power supply or 1.4 volts for a 3.3 V power supply. (See Kozlowski at col. 6, lines 4-7.)

Accordingly, claim 1 is submitted to patentably distinguish over Borg in view of Hynecek and Kozlowski for at least the reasons set forth above.

Although not the same, independent claims 5, 10 and 13 include features similar to claim 1. Claims 5, 10 and 13 are, therefore, not subject to rejection in view of the cited references for the same reasons set forth above for amended claim 1.

Dependent claims 2-4 depend from amended claim 1. Dependent claims 7-9 depend from amended claim 5. Dependent claims 11-12 depend from amended claim 10. Dependent claim 14 depends from amended claim 13. These dependent claims, therefore, are not subject to rejection in view of the cited references for at least the same reasons set forth above for amended claim 1.

Conclusion

In view of the remarks, Applicants submit the application is in condition for allowance, which action is respectfully requested.

Respectfully submitted,



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